Manual
1 of 2

Data Acquisition

ATDAQ DLL

Windows 3.11/95/98/NT/2000 Software Drivers for ATAO and ATDAQ Cards

USER'S MANUAL

VER. 5.01• SEPT 2000

No part of this manual may be reproduced without permission

CyberResearch®, Inc.

www.cyberresearch.com

25 Business Park Dr., Branford, CT 06405 USA

203-483-8815 (9am to 5pm EST) FAX: 203-483-9024

©Copyright 2000
All Rights Reserved.

September 2000

The information in this document is subject to change without prior notice in order to improve reliability, design, and function and does not represent a commitment on the part of CyberResearch, Inc.

In no event will CyberResearch, Inc. be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of or inability to use the product or documentation, even if advised of the possibility of such damages.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of CyberResearch, Inc.

Trademarks

"CyberResearch," and "ATDAQ DLL," are trademarks of CyberResearch, Inc. Other product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

• NOTICE •

CyberResearch, Inc. does not authorize any CyberResearch product for use in life support systems, medical equipment, and/or medical devices without the written approval of the President of CyberResearch, Inc. Life support devices and systems are devices or systems which are intended for surgical implantation into the body, or to support or sustain life and whose failure to perform can be reasonably expected to result in injury. Other medical equipment includes devices used for monitoring, data acquisition, modification, or notification purposes in relation to life support, life sustaining, or vital statistic recording. CyberResearch products are not designed with the components required, are not subject to the testing required, and are not submitted to the certification required to ensure a level of reliability appropriate for the treatment and diagnosis of humans.

Intentionally Blank

Table of Contents

Table of Contents v

How to Use This Guide vii

Introduction to ATDAQ DLL 1

1.1 What is ATDAQ DLL 1

1.2 Installing ATDAQ DLL 2

1.2.1 System Requirements 2
1.2.2 ATDAQ DLL Installation 3
1.2.4 ATDAQ DLL Un-installation 11

1.3 ATDAQ DLL Hardware Support 12

1.4 ATDAQ DLL Language Support 12

1.5 System Architecture 13

1.6 ATDAQ DLL Device Driver Handling in Win-NT/2000 14

1.6.1 ATDAQ DLL Device Driver Configuration 19

1.7 Using ATDAQ DLL 22

1.7.1 Creating An Application Using Visual Basic and ATDAQ DLL 22
1.7.2 Creating An Application Using Microsoft Visual C/C++ and ATDAQ DLL 24

Software Overview 27

2.1 Software Driver Naming Convention 28

2.2 Initialization and General Configuration Functions 29

2.3 A/D Conversion Functions 29

2.4 D/A Conversion Functions 32

2.5 Digital I/O Functions.....34

2.6 Timer/Counter Operation Functions 34

Sample Programs 35

3.1 Sample Programs Included 35

3.2 Sample Programs Developed Environment.....39

3.2.1 Visual Basic Sample Programs 39
3.2.2 Microsoft C/C++ Sample Programs 39

3.3 Execute Sample Programs 40

3.4 The Detailed Descriptions of these Sample Programs.....41

3.4.1 A/D conversion, D/A conversion, D/I, and D/O..... 41
3.4.2 A/D conversion through DMA Data Transfer..... 43
3.4.3 A/D conversion through Interrupt..... 44

How to Use This Guide

This manual is designed to help you use the ATDAQ DLL software driver for CyberResearch ISA-bus multi-function cards ATAO 06, ATAO 02, ATDAQ 1412HR, ATDAQ 1612/HR, ATDAQ 1200, ATDAQ 3210, ATDAQ 3210A, and ATDAQ 1400, 1411 & 1412. The manual describes how to install and use the library to meet your requirements and help you program your own software application. When you are familiar with the material in this manual, you can begin to use the *ATDAQ DLL Function Reference Manual*. The ATDAQ DLL Function Reference Manual contains detailed descriptions of the ATDAQ DLL functions. You also can use the help file *ATDAQ DLL.HLP*, located in your ATDAQ DLL software, which contains all of the function reference material.

The *ATDAQ DLL Function Reference Guide* is organized as follows:

- Chapter 1, "Introduction to ATDAQ DLL" gives an overview of the contents included in the software package and describes how to install the software and create your applications by using ATDAQ DLL.

- Chapter 2, "Software Overview" briefly describes the function calls ATDAQ DLL provides.

- Chapter 3, "Sample Programs" describes the sample programs in the software CD.

Intentionally Blank

1

Introduction to ATDAQ DLL

1.1 What is ATDAQ DLL

ATDAQ DLL is the Microsoft Windows drivers for CyberResearch ISA-bus multi-function cards ATAO 06, ATAO 02, ATDAQ 1200, ATDAQ 3210, ATDAQ 3210A, ATDAQ 1411/1412, ATDAQ 1400, ATDAQ 1412HR and ATDAQ1612/HR. They are high performance data acquisition drivers for developing custom applications under Windows 3.1, Windows 95/98, Win-NT 4.0 and Windows 2000. These drivers are DLLs (Dynamic-Link Library) for using under Windows. They can work with any Windows programming language that allows calls to a DLL, such as Microsoft C/C++, Microsoft Visual Basic.

Built into these DLLs are sophisticated memory and data buffer management capabilities that free developers from having to deal with those complex issues.

Using these DLLs lets you take advantage of the power and features of Microsoft Windows 3.11, Win-NT 4.0, Windows 95/98 and Windows 2000 for your data acquisition application. These include running multiple applications and using extended memory. Also, Visual Basic and ATDAQ DLL's DLLs make it easy to create custom user interfaces and graphics.

In addition to the DLL drivers, some sample programs are also provided; you can refer to it and save a lot of programming time and get some other benefits as well.

1.2 Installing ATDAQ DLL

1.2.1 System Requirements

ATDAQ DLL requires the following minimum configuration:

- An IBM PC/AT or 100% compatible with an 80386 or higher processor
- 4MB of available memory
- A hard disk with enough disk space to install ATDAQ DLL
- A 1.44-MB, 3.5-inch floppy disk drive or CD-ROM drive
- Microsoft Windows 3.11, Windows 95/98, Win-NT 4.0 or Windows 2000
- Application development system: Microsoft C/C++ and Windows SDK, Microsoft Visual C/C++, or Microsoft Visual Basic.
- ATAO 06, ATAO 02, ATDAQ 1200, ATDAQ 3210, ATDAQ 3210A, ATDAQ 1411/1412, ATDAQ1400, ATDAQ 1412HR, or ATDAQ 1612/HR multi-function card

1.2.2 ATDAQ DLL Installation

The Setup program provided by ATDAQ DLL performs all the tasks necessary for installing the ATDAQ DLL components.

To install ATDAQ DLL:

With "ATDAQ DLL Library & Utility":

step 1. Place the CD in the appropriate CD drive (usually D:).

step 2. If Windows is loaded, choose Run from the Start Menu.

step 3. Typing the D:\SETUP (where D is the CD drive) in the Run dialog box.

With "Manual & Software Utility" CD:

step 1 Place the CyberResearch Software CD into the appropriate CD-ROM drive.

step 2 If autorun setup program is not invoked automatically, please click the *Start* button on the Taskbar, and then choose *Run*. Type *x*:\setup (*x* identifies the drive that contains the compact disc) in *Open* text box, and then click *OK*.

Step 3 Setup first displays the main screen. Select *"Your Computer's Operating System."*

Step 4 Setup then displays the CyberResearch Software Product Screen. Select ISA Series .

Step 5 In the ISA Series screen select *ATDAQ DLL*.

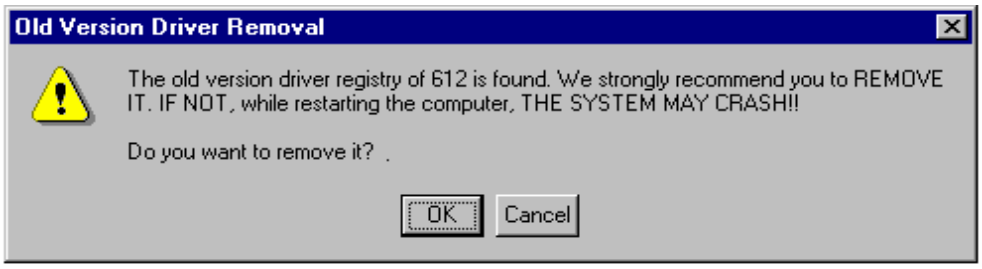
Setup first displays a Welcome dialog box. Please click **Next** button to go on installation.

Setup then prompts a dialog box for you to specify the destination directory for ATDAQ DLL. The default path is C:\ATDAQ DLL. If you want to install ATDAQ DLL in another directory, please click **Browse** button to change the destination directory. Then you can click **Next** to begin installing ATDAQ DLL.

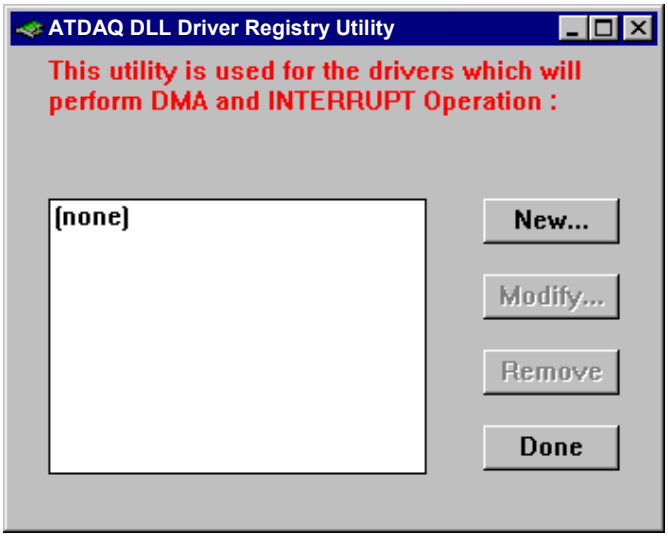
[Windows NT/2000 version]

When the software component installation process is completed, Setup will launch the *ATDAQ DLL Driver Registry Utility* for you to make the registry of the drivers that you want to perform **DMA or *interrupt operation***.

The *ATDAQ DLL Driver Registry Utility* first checks the system for the old version of ATDAQ DLL driver registry. If there any old version of ATDAQ DLL driver registry exists in the system, an old registry removal message box will appear as the figure below. For the new version of ATDAQ DLL working properly, click “OK” button. If the old version of ATDAQ DLL driver registry is not removed, when you re-start the Windows NT system, the system may crash.

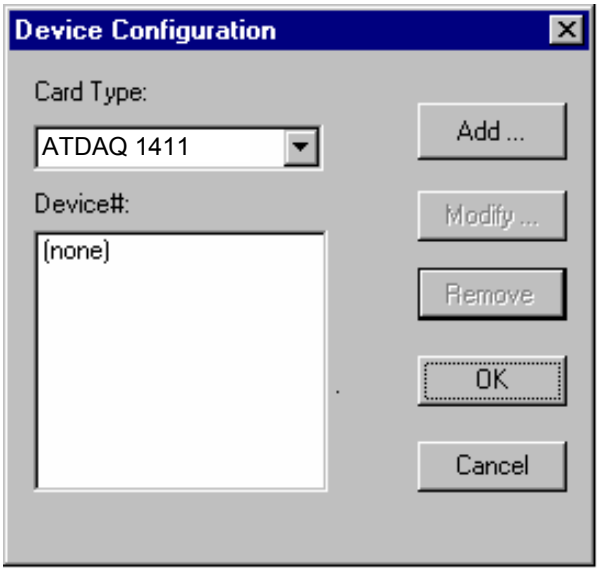

Old Version Driver Removal
The old version driver registry of 612 is found. We strongly recommend you to REMOVE IT. IF NOT, while restarting the computer, THE SYSTEM MAY CRASH!!
Do you want to remove it? .
OK
Cancel

After the check of old version of the ATDAQ DLL driver, the *ATDAQ DLL Driver Registry Utility* shows the following window. If any ATDAQ DLL drivers have been registered, it will be shown on the *Registerer Driver* list.



If the card you wish to operate **DOES NOT** want to perform interrupt or DMA operation, please click **Done** button to exit this utility.

To register one of ATDAQ DLL drivers, click **New…** button and a *Device Configuration* window appears.

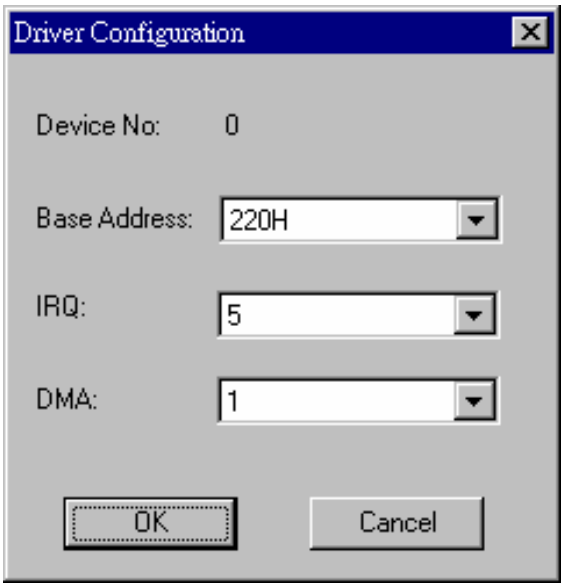


From this window you can select the driver you want to register. Since ATDAQ DLL drivers for Windows NT/2000 can support more than one device, you can configure more than one device for each ATDAQ DLL driver. The maximum number of device that each driver supports is as the following table.

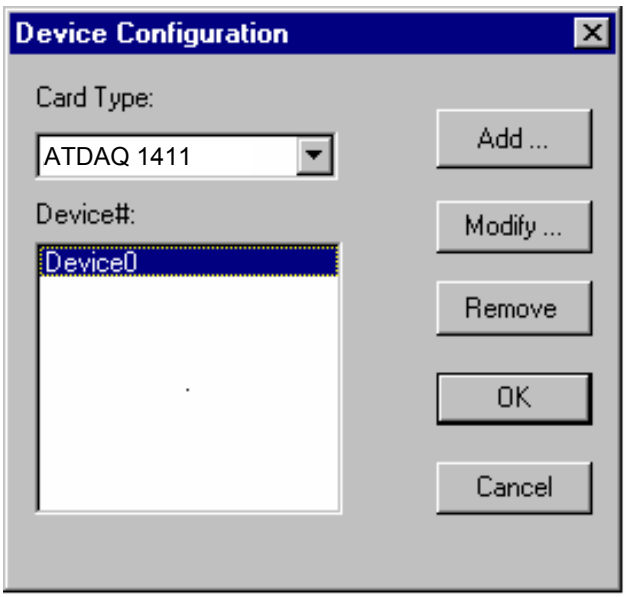
Driver Name	Number of Device (Valid Device Name)
ATAO06	2 (Device0, Device1)
ATDAQ1200	2 (Device0, Device1)
ATDAQ1411	2 (Device0, Device1)
ATDAQ1412HR	2 (Device0, Device1)
ATDAQ1612HR	3 (Device0, Device1, Deivce2)

If the driver you select has been registered, the “Device#” list gives the device names of the devices configured.

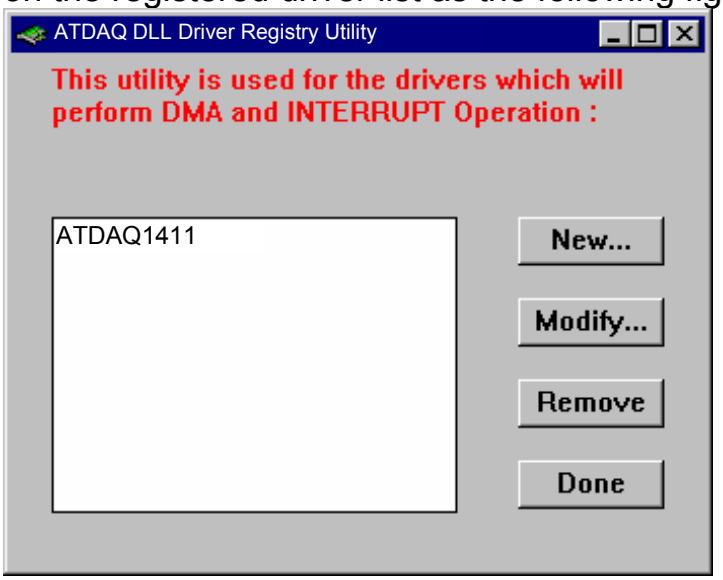
To add a device, click **Add…** button and a *Driver Configuration* window appears for you to set DMA channel, IRQ level and base address. The *Driver Configuration* window is as the following figure:



After the setting for DMA channel, IRQ level and base address, click **OK** and *Device Configuration* window re-appears. The device you just added is shown on “*Device#”* list as the following figure.

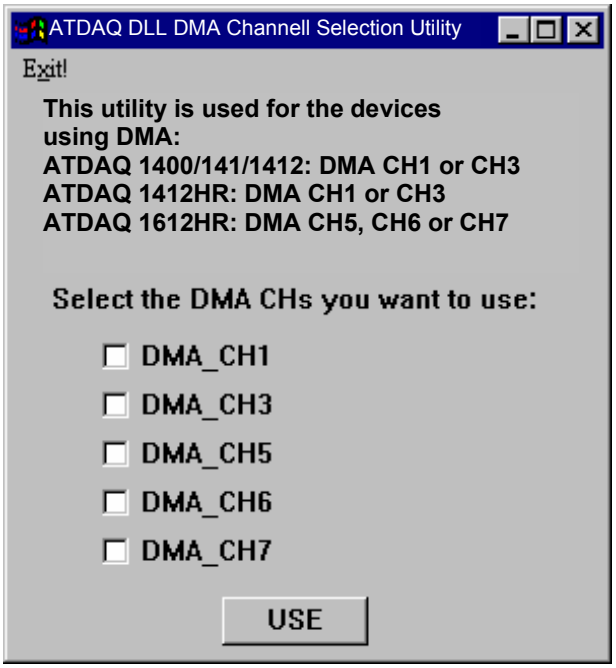


After the device configurations of the driver you select is finished, click **OK** button to register the driver and return to *Driver Registry Utility* main window. The driver you just registered will be shown on the registered driver list as the following figure:



When you finish the driver registries, select **Done** button to exit this utility. To make the registered drivers work, you have to re-start Windows NT/2000 system.

[Window 95/98 version]



For an ATDAQ DLL driver to perform a DMA operation properly, the system should know the DMA channels the devices will use. When the software component installation process is completed, Setup will launch the *ATDAQ DLL DMA Channel Selection Utility* for you to select the DMA channels. The *ATDAQ DLL DMA Channel Selection Utility* is shown as the following figure:

Check the desired DMA channels and then click **USE** button to inform the system that the DMA channels the ATDAQ DLL devices will use. Then you select **Exit!** command in the menu bar to exit *ATDAQ DLL DMA Channel Selection Utility*. Re-start Windows 95/98 system to make the system DMA channels selection effective.

[Window 95/98 , Window NT/2000 versions]

When you have completed the installation process, the ATDAQ DLL directory should contain the following files and sub-directories:

File/Subdirectory	Description
LIB <DIR>	ATDAQ DLL import libraries and DLLs Note: *.*lib* for Microsoft C/C++ and Visual C/C++ programming, e.g. ATDAQ1200.lib *_*bc.lib* for Borland C++ programming, e.g. ATDAQ1200_bc.lib
INCLUDE <DIR>	Include files for application programming. ATDAQDLL.H for Microsoft C/C++ and Visual C/C++ programming. ATDAQDLL.BAS for Visual Basic Programming. *ATDAQDLL.PAS* for Delphi programming
UTIL<DIR>	Registry utility of ATDAQ DLL's device drivers (Windows NT only) System DMA Selection utility (Windows 95 only)
SAMPLES\SDK\ATAO06 <DIR>	ATAO 06 Visual C/C++ sample program
SAMPLES\SDK\ATAO06INT <DIR>	ATAO 06 Interrupt AO Visual C/C++ sample program
SAMPLES\SDK\ATAO02 <DIR>	ATAO 02 Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1200 <DIR>	ATDAQ 1200 Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1200INT <DIR>	ATDAQ 1200 Interrupt AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1200SCAN <DIR>	ATDAQ 1200 Interrupt AI with AutoScan mode , Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1200DBINT <DIR>	ATDAQ 1200 Continuous Interrupt AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1200DBSCAN <DIR>	ATDAQ 1200 Continuous Interrupt AI with AutoScan mode , Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1411 <DIR>	ATDAQ 1411 Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1411DMA <DIR>	ATDAQ 1411 DMA AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1411INT <DIR>	ATDAQ 1411 Interrupt AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1411SCAN <DIR>	ATDAQ 1411 Interrupt AI wit AutoScan mode , Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1411DBINT <DIR>	ATDAQ 1411 Continuous Interrupt AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1411DBSCAN <DIR>	ATDAQ 1411 Continuous Interrupt AI wit AutoScan mode , Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1411DBDMA <DIR>	ATDAQ 1411 Continuous DMA AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ3210 <DIR>	ATDAQ 3210 Visual C/C++ sample program

SAMPLES\SDK\ATDAQ3210A <DIR>	ATDAQ 3210A Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1400 <DIR>	ATDAQ 1400 Visual C/C++ sample program
SAMPLES\SDK\ ATDAQ1400 DMA <DIR>	ATDAQ 1400 DMA AI Visual C/C++ sample program
SAMPLES\SDK\ ATDAQ1400 INT <DIR>	ATDAQ 1400 Interrupt AI Visual C/C++ sample program
SAMPLES\SDK\ ATDAQ1400 SCAN <DIR>	ATDAQ 1400 Interrupt AI with AutoScan mode,Visual C/C++ sample program
SAMPLES\SDK\ ATDAQ1400 DBINT <DIR>	ATDAQ 1400 Continuous Interrupt AI Visual C/C++ sample program
SAMPLES\SDK\ ATDAQ1400 DBDMA <DIR>	ATDAQ 1400 Continuous DMA AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1412HR <DIR>	ATDAQ 1412HR Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1412HRDMA <DIR>	ATDAQ 1412HR DMA AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1412HRINT <DIR>	ATDAQ 1412HR Interrupt AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1412HRSCAN <DIR>	ATDAQ 1412HR Interrupt AI with AutoScan mode ,Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1412HRDBINT <DIR>	ATDAQ 1412HR Continuous Interrupt AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1412HRDBDMA <DIR>	ATDAQ 1412HR Continuous DMA AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1612HR <DIR>	ATDAQ 1612HR Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1612HRDMA <DIR>	ATDAQ 1612HR DMA AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1612HRINT <DIR>	ATDAQ 1612HR Interrupt AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1612HRDBSCAN <DIR>	ATDAQ 1612HR Continuous Interrupt AI with AutoScan mode ,Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1612HRDBINT <DIR>	ATDAQ 1612HR Continuous Interrupt AI Visual C/C++ sample program
SAMPLES\SDK\ATDAQ1612HRDBDMA <DIR>	ATDAQ 1612HR Continuous DMA AI Visual C/C++ sample program
SAMPLES\VB\ATAO06 <DIR>	ATAO 06 Visual Basic sample program
SAMPLES\VB\ATAO02 <DIR>	ATAO 02 Visual Basic sample program
SAMPLES\VB\ATDAQ1200 <DIR>	ATDAQ 1200 Visual Basic sample program
SAMPLES\VB\ATDAQ1411 <DIR>	ATDAQ 1411 Visual Basic sample program
SAMPLES\VB\ATDAQ1411DMA <DIR>	ATDAQ 1411 DMA AI Visual Basic sample program
SAMPLES\VB\ATDAQ1411INT <DIR>	ATDAQ 1411 Interrupt AI Visual Basic sample program

SAMPLES\VB\ATDAQ1411CINT <DIR>	ATDAQ 1411 Continuous Interrupt AI Visual Basic sample program
SAMPLES\VB\ATDAQ1411SCAN <DIR>	ATDAQ 1411 Interrupt AI with AutoScan mode , Visual Basic sample program
SAMPLES \VB\ATDAQ1411CDMA <DIR>	ATDAQ 1411 Continuous DMA AI Visual Basic sample program
SAMPLES\VB\ATDAQ1400 <DIR>	ATDAQ 1400 Visual Basic sample program
SAMPLES\VB\ATDAQ3210 <DIR>	ATDAQ 3210 Visual Basic sample program
SAMPLES\VB\ATDAQ1412HR <DIR>	ATDAQ 1412HR Visual Basic sample program
SAMPLES\VB\ATDAQ1412HRDMA <DIR>	ATDAQ 1412HR DMA AI Visual Basic sample program
SAMPLES\VB\ATDAQ1412HRINT <DIR>	ATDAQ 1412HR Interrupt AI Visual Basic sample program
SAMPLES\VB\ATDAQ1612HR <DIR>	ATDAQ 1612HR Visual Basic sample program
SAMPLES\VB\ATDAQ1612HRDMA <DIR>	ATDAQ 1612HR DMA AI Visual Basic sample program
SAMPLES\VB\ATDAQ1612HRINT <DIR>	ATDAQ 1612HR Interrupt AI Visual Basic sample program

All ATDAQ's DLLs are also copied to Windows System directory (default is C:\WINDOWS\SYSTEM for Windows 3.11 or Win-95/98, C:\Winnt\System32 for Windows NT/2000).

The driver files are also copied to the appropriate directory:

- Windows 3.11 Version: ACLVDMA1.386 and ACLVDMA3.386 are copied to Windows System directory.
- Win-95/98 Version: ACLVDMA1.386, ACLVDMA3.386, ACLVDMA5.386, ACLVDMA6.386, ACLVDMA7.386, W95_dll2.VXD, W95_DL22.VXD, and W95_8316.VXD are copied to Win-95/98 System directory.
- Windows NT/2000 Version: DIO.SYS, ATAO06.SYS, ATDAQ1200.SYS, ATDAQ1411.SYS, ATDAQ1412HR.SYS, and ATDAQ1612HR.SYS are copied to Win-NT/2000 System Drivers directory (default is C:\Winnt\System32\Drivers).

1.2.4 ATDAQ DLL Un-installation

ATDAQ DLL software has the capability of automatic un-installation.

To un-install ATDAQ DLL, open the “Control Panel”, double-click “Add/Remove Programs” and select ATDAQ DLL to uninstall.

1.3 ATDAQ DLL Hardware Support

The ATDAQ DLL supports the following hardware:

ATAO 06 : 6 Channels, 12-bit Voltage & Current Outputs Card
ATAO 02 : Isolated 2 Channels Analog Output Card
ATDAQ 1200 : Multi-function Data Acquisition Card
ATDAQ 1411/1412 : Enhanced Multi-function Data Acquisition Card
ATDAQ 1400 : Enhanced Multi-function Data Acquisition Card
ATDAQ 3210/ATDAQ3210A : 32 Channels Signal-ended Isolated A/D Card
ATDAQ 1412HR : 16-bit High Resolution Multi-function DAS Card
ATDAQ1612/HR: 12/16-bit High Resolution/Performance DAS Card with FIFO

1.4 ATDAQ DLL Language Support

ATDAQ DLL (Dynamic-Link Library) is for use under Windows 3.1/95/98/NT/2000. It can work with any Windows programming language that allows calls to a DLL, such as Microsoft Visual C/C++ (4.0 or above), Borland C++ (5.0 or above), or Microsoft Visual Basic (4.0 or above), etc.

1.5 System Architecture

The following diagram shows the interface between your applications and ATDAQ DLL drivers:

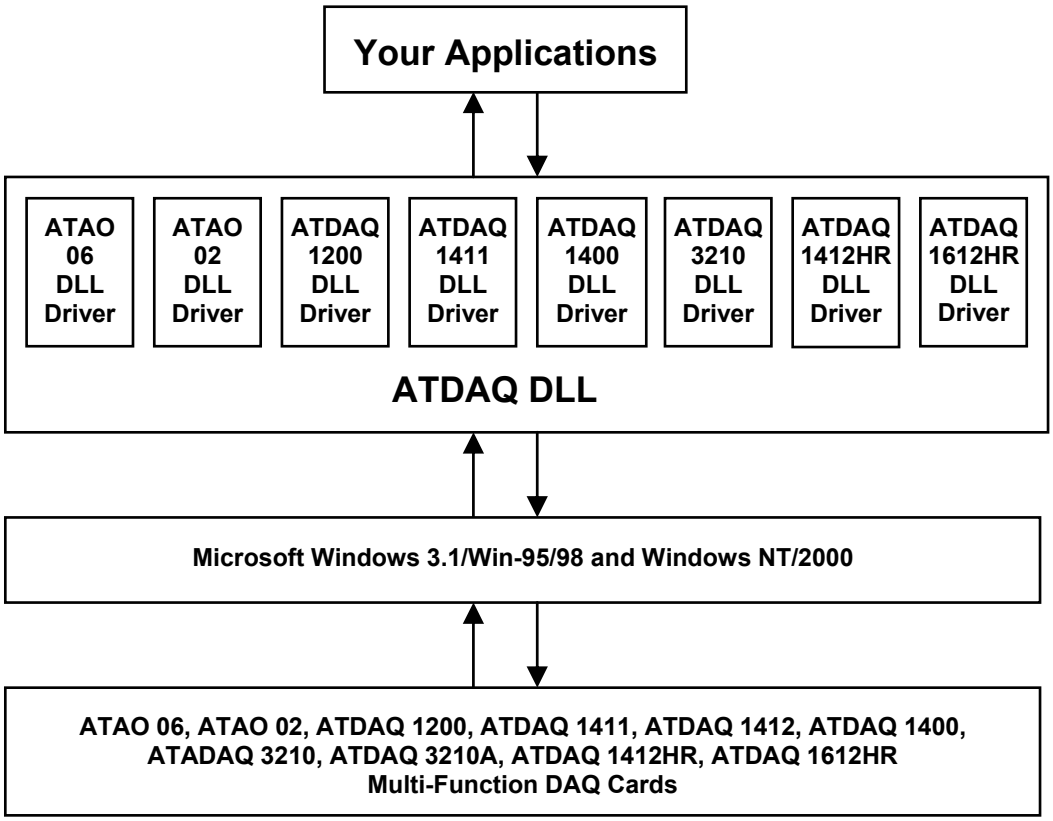

Your Applications
ATAO 06 DLL Driver
ATAO 02 DLL Driver
ATDAQ 1200 DLL Driver
ATDAQ 1411 DLL Driver
ATDAQ 1400 DLL Driver
ATDAQ 3210 DLL Driver
ATDAQ 1412HR DLL Driver
ATDAQ 1612HR DLL Driver
ATDAQ DLL
Microsoft Windows 3.1/Win-95/98 and Windows NT/2000
ATAO 06, ATAO 02, ATDAQ 1200, ATDAQ 1411, ATDAQ 1412, ATDAQ 1400, ATADAQ 3210, ATDAQ 3210A, ATDAQ 1412HR, ATDAQ 1612HR Multi-Function DAQ Cards

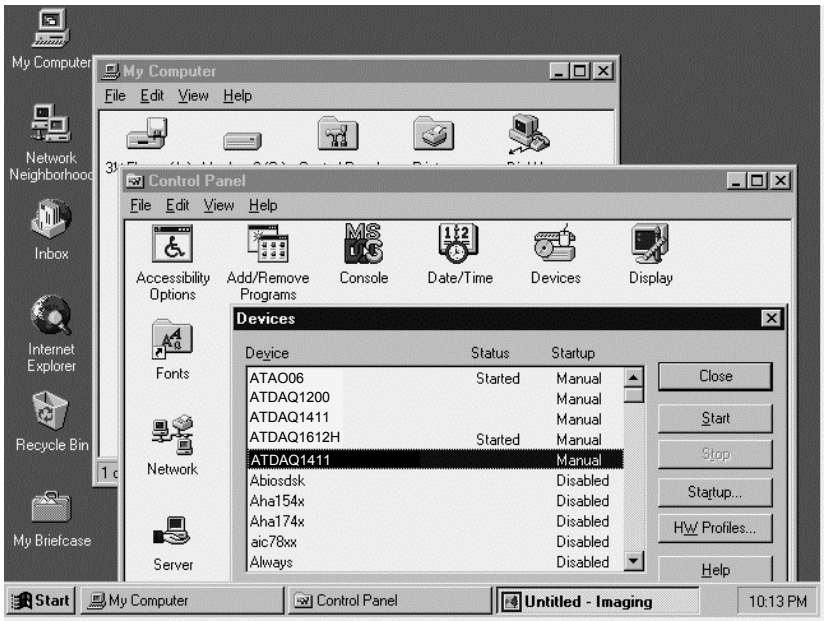
Figure 1.1

1.6 ATDAQ DLL Device Driver Handling in Win-NT/2000

[Under Win-NT 4.0]

When you completed the ATDAQ DLL installation in Win-NT, please be careful of the following issue:

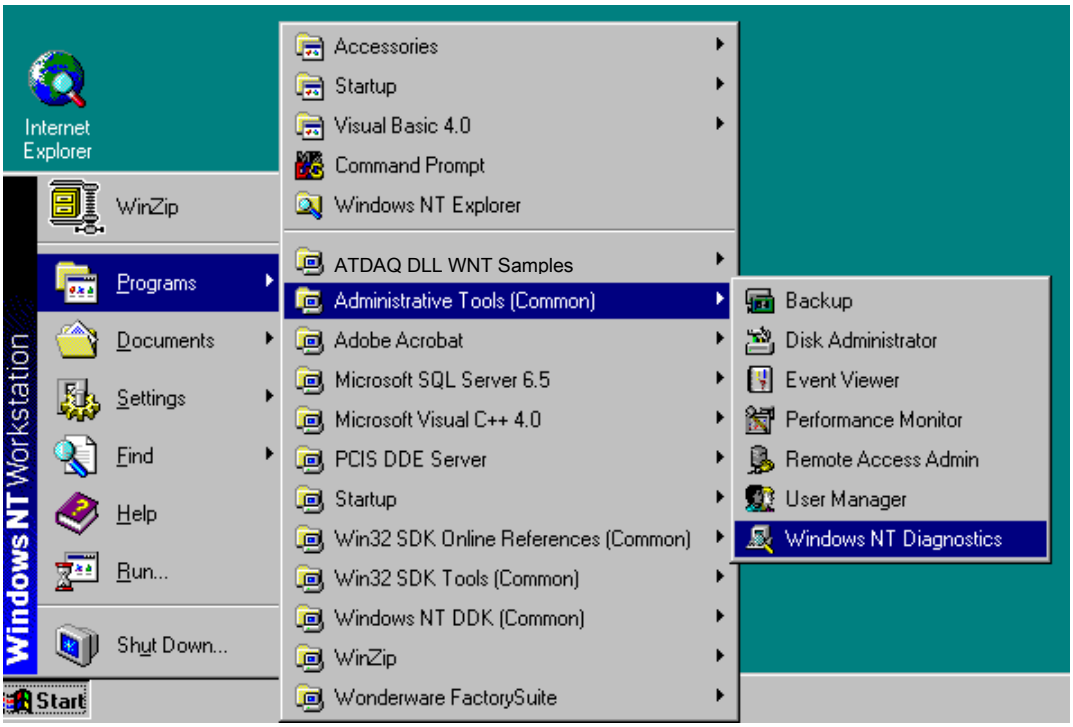
Make sure the ATDAQ DLL device drivers (ATAO06, ATDAQ1200, ATDAQ1411, ATDAQ1412HR, ATDAQ1612HR or Dio) are already started. You can open the “Control Panel”, double-click “Devices”, and a Devices windows will be shown as below.

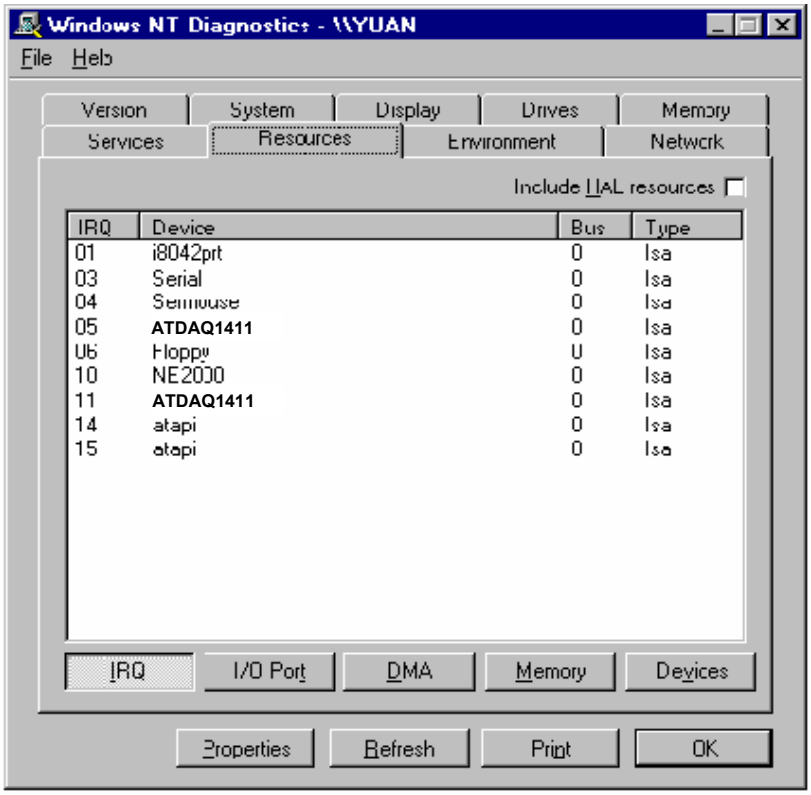


If the device status is none, you have to select the ATAO06, ATDAQ1200, ATDAQ1411, ATDAQ1412HR, ATDAQ1612HR or Dio device and press the **Start** button.

If your device driver can not be started, please check if the resources (I/O Port Address, IRQ Level, or DMA Channel) of all the devices of this driver conflict with other hardware device. (*Note: If at least one device of this driver is loaded successfully, the device status will be “Started”*). You can use a Windows NT built-in program *“Windows NT Diagnostics”* to get the resource information in your system. To evoke this program, select

Programs from *Start* menu, choose *"Administration Tools"*, and then a *Windows NT Diagnostics* window will be shown as below:




Windows NT Diagnostics - \\YUAN
File Help
Version System Display Drives Memory
Services Resources Environment Network
Include UAL resources
IRQ Device Bus Type
01 i8042prt 0 Isa
03 Serial 0 Isa
04 Serimouse 0 Isa
05 ATDAQ1411 0 Isa
06 Floppy 0 Isa
10 NE2000 0 Isa
11 ATDAQ1411 0 Isa
14 atapi 0 Isa
15 atapi 0 Isa
IRQ I/O Port DMA Memory Devices
Properties Refresh Print OK

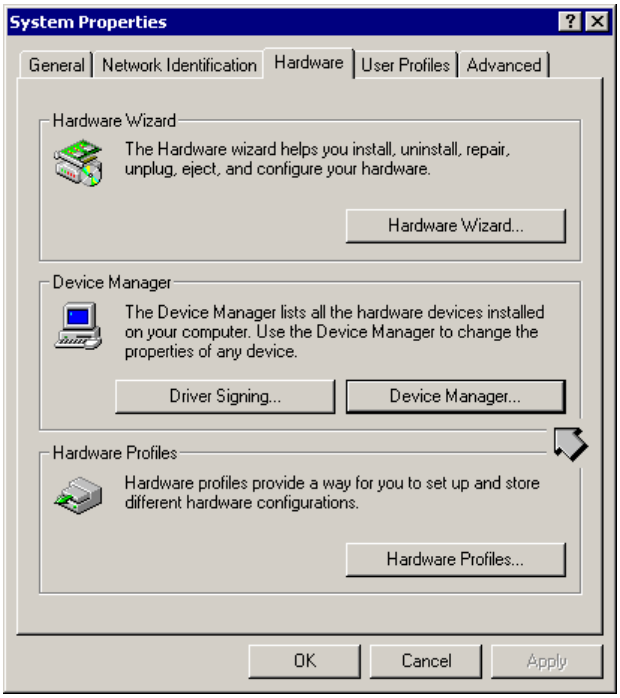
Each button in this window links to the corresponding hardware information. Therefore you can get the resource allocation information in your system and check if your ATDAQ DLL devices are loaded successfully. Please refer to Windows NT user's manual for the details about this program. The resource setting modification of ATDAQ DLL devices is described in following section.

Note : The resource usage information *Windows NT Diagnostics* program provides is only the information the hardware drivers which have made registry in NT system. If some devices set their resource request in CMOS (e.g. LPT1), but don't make registry in NT system, you can't get their resource information from *Windows NT Diagnostics* program. Please refer to Appendix A for the general I/O port address map and IRQ settings.

[Under Win-2000]

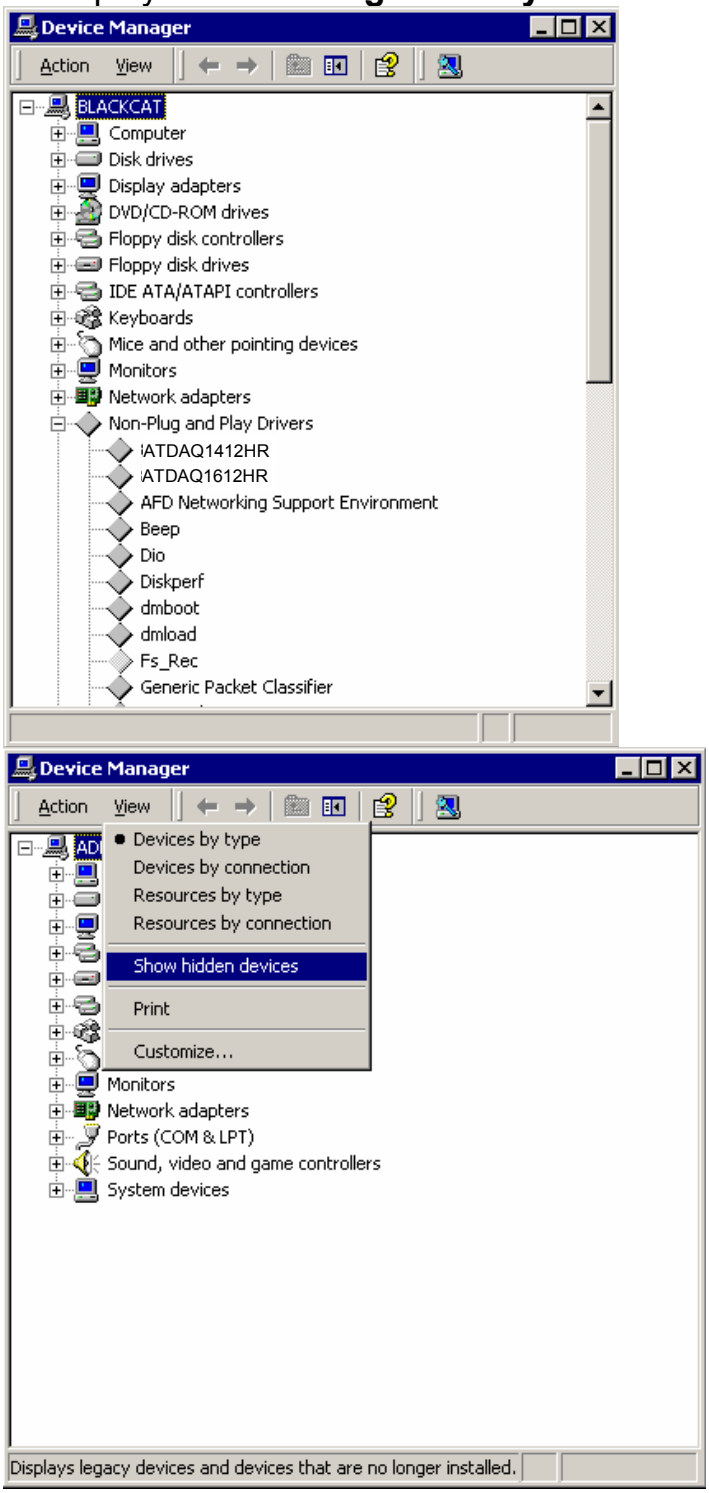
When you completed the ATDAQ DLL installation in Win-2000, please be careful of the following issue:

Make sure the ATDAQ DLL device drivers (ATAO06, ATDAQ1200, ATDAQ1411, ATDAQ1412HR, ATDAQ1612HR or Dio) are already started. You can open the Device Manager in **Start>>Settings>>Control Panel>>System**, and then select the


System Properties
General
Network Identification
Hardware
User Profiles
Advanced
Hardware Wizard
The Hardware wizard helps you install, uninstall, repair, unplug, eject, and configure your hardware.
Hardware Wizard...
Device Manager
The Device Manager lists all the hardware devices installed on your computer. Use the Device Manager to change the properties of any device.
Driver Signing...
Device Manager...
Hardware Profiles
Hardware profiles provide a way for you to set up and store different hardware configurations.
Hardware Profiles...
OK
Cancel
Apply

Hardware tab.

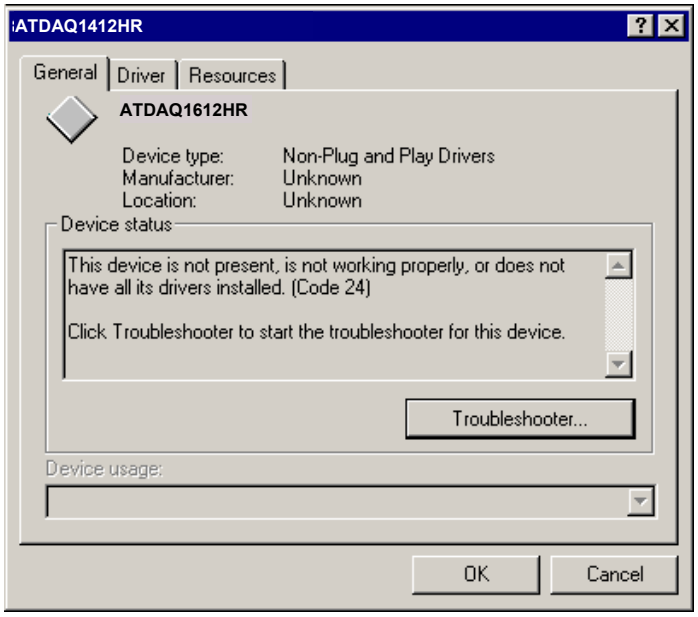
In Device Manager, you should select ***Show hidden devices*** item to display the **Non-Plug and Play Drivers.**

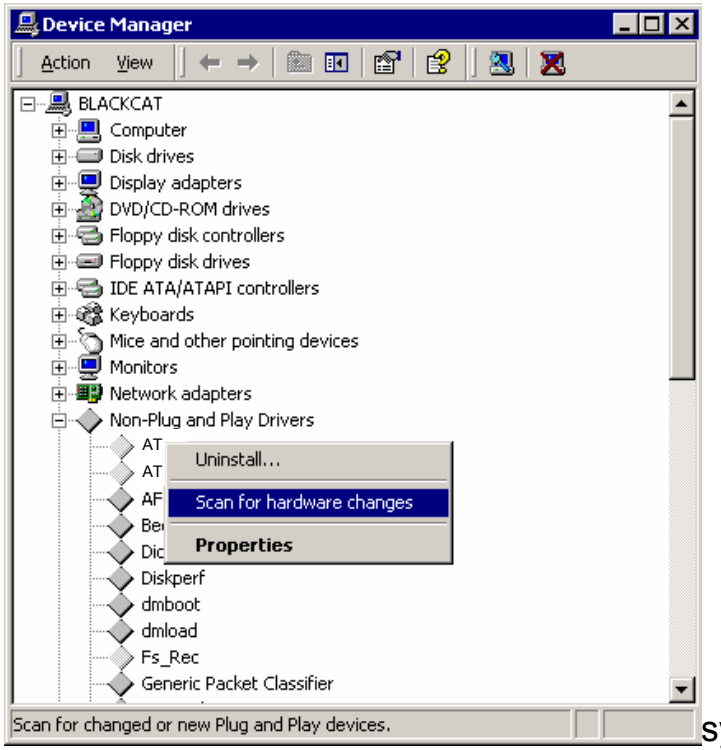


And then you can double-click the device and select the **Resources** tab to check if I/O port and IRQ resources for the device are allocated successfully.

If your ATDAQ DLL devices are not loaded successfully, you will see light gray device icons in the **Device Manager**.

Double-click the icon, the Device Status will show the error message as the following figure:

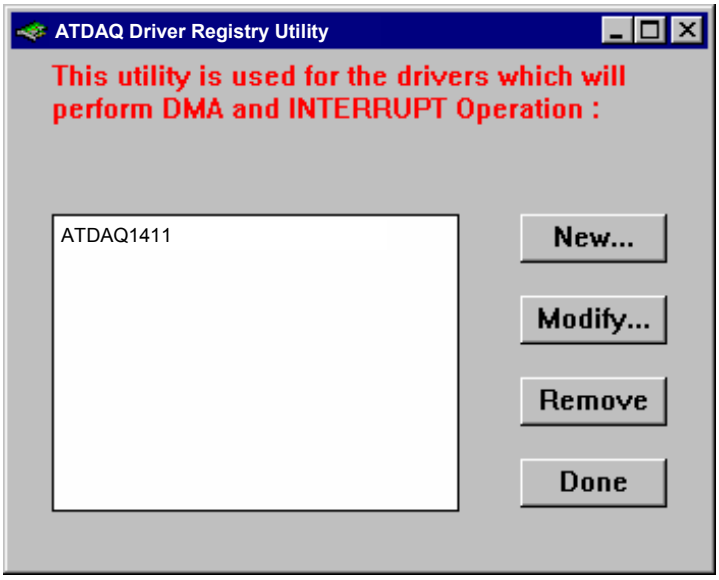


To solve this problem, you can *right-click* the device icon, and select the **Scan for hardware changes** item in pop-up menu. The system will re-load the device drivers with the resource registered in 

system registry.

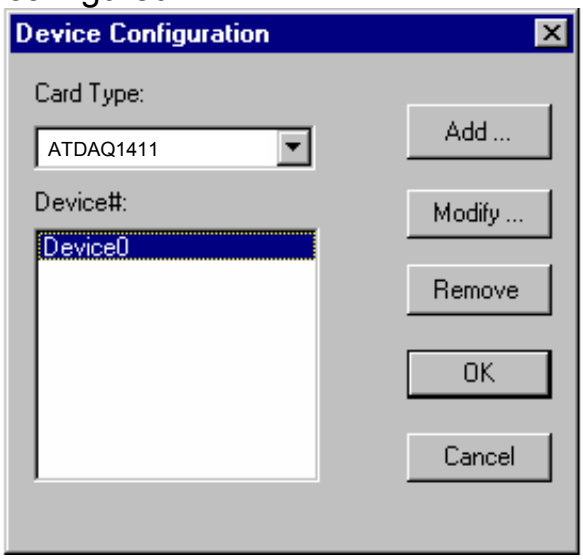
1.6.1 ATDAQ DLL Device Driver Configuration

ATDAQ DLL provides a utility, *ATDAQ DLL Driver Registry Utility*. This utility is used for users to ***make the registry*** of new ATDAQ DLL drivers (the drivers you want to perform DMA or interrupt operation), ***remove*** installed drivers and ***modify*** the base address, DMA channel and IRQ level settings of installed drivers. The *ATDAQ DLL Driver Registry Utility* main window is as the following figure. The *ATDAQ DLL Driver Registry Utility* is installed with ATDAQ DLL and located in <InstallDir>\Util directory.

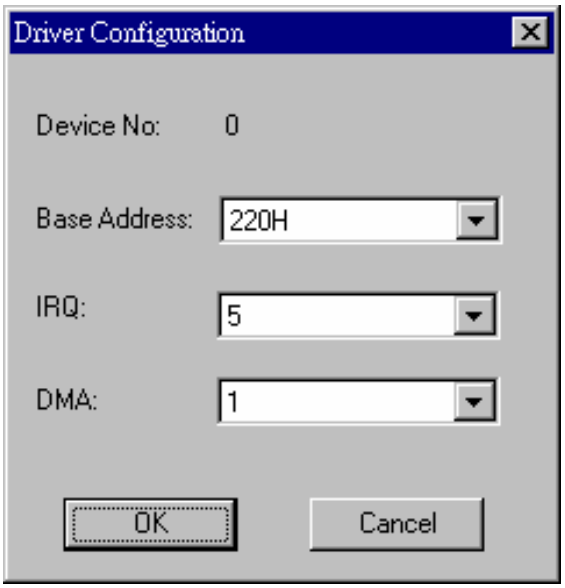


Using this utility to ***install*** a new driver, please refer to section 2.1.3.

Using *ATDAQ DLL Driver Registry Utility* to ***change the settings of one device*** of one of the ATDAQ DLL drivers, select the driver from the *Registered Driver* list and click "Modify…" button and then a "Driver Configuration" window is shown as below. The "Device#" list gives the device names of the devices configured.



To modify the settings of IRQ level, DMA channel and Base Address of a device, click "Modify…" button and a *Driver Configuration* window appears for you to modify DMA channel, IRQ level and base address.



Inside the Base Address, DMA and IRQ fields are the originally set values. Modify the values and then click “OK” button. The settings for the device will be changed as you modified and return to *Device Configuration* window. Then you can click ‘OK” button in *Device Configuration* window and the settings for the driver will be modified.

To ***remove*** a registered driver, select the driver from the *Registered Driver* list in The *ATDAQ DLL Driver Registry Utility* main window and click “Remove” button. The selected driver will be deleted from the registry table.

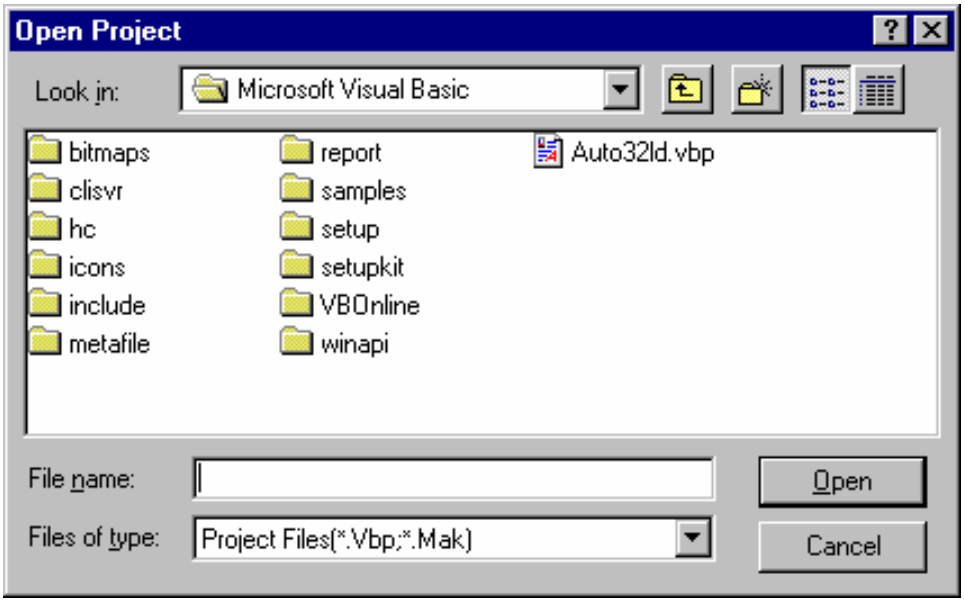
1.7 Using ATDAQ DLL

1.7.1 Creating An Application Using Visual Basic and ATDAQ DLL

To create a data acquisition application using ATDAQ DLL and Visual Basic, follow these steps after entering Visual Basic:

step 1. Open the project in which you want to use ATDAQ DLL. This can be a new or existing project

Open a new project by selecting the New Project command from the File menu. If it is an existing project, open it by selecting the Open Project command from the File menu. Then the Open Project dialog box appears.



Changed directory to the place the project file located. Double-click the project file name in the File Name list to load the project.

step 2. Add file ATDAQ DLL.BAS into the project if this file is not included in the project. This file contains all the procedure declarations and constants that you can use to develop your data acquisition application.

From the File menu, select the Add File command. The Add File window appears, displaying a list of files in the current directory.

Select ATDAQDLL.BAS from the Files list by double clicking on it. If you can't find this file in the list, make sure the list is displaying files from the correct directory. By default, ATDAQDLL.BAS is installed in C:\ ATDAQDLL\INCLUDE.

step 3. Design the interface for the application.

To design the interface, you place the desired elements, such as command button, list box, text box, etc., on the Visual Basic form. These are standard controls from the Visual Basic Toolbox. To place a control on a form, you just move pointer to Toolbox, select the desired control and draw it on the form. Or you can double-click the control icon in the Toolbox to place it on the form.

step 4. Set properties for the controls.

To view the property list, click the desired control and then choose the Properties command from the View menu or press F4, or you can also click the Properties button on the toolbar.

step 5. Write the event code.

The event code defines the action you want to perform when an event occurs. To write the event code, double-click the desired control or form to view the code module and then add code you want. You can call the functions that declared in the file ATDAQDLL.BAS to perform data acquisition operations.

step 6. Run your application.

To run the application, choose Start from the Run menu, or click the Start icon on the toolbar (you can also press F5).

step 7. Distribute your application.

Once you have finished a project, you can save the application as an executable (.EXE) file by using the Make EXE File command on the File menu. And once you have saved your application as an executable file, you've ready to distribute it. When you distribute your application, remember also to include the ATDAQ DLL's DLL and driver files. These files should be copied to their appropriate directory as section 2.1.3 described.

1.7.2 Creating An Application Using Microsoft Visual C/C++ and ATDAQ DLL

To create a data acquisition application using ATDAQ DLL and Microsoft Visual C/C++, follow these steps after entering Visual C/C++:

step 1. Open the project in which you want to use ATDAQ DLL. This can be a new or existing project

step 2. Include header file ATDAQDLL.H in the C/C++ source files that call ATDAQ DLL functions. ATDAQDLL.H contains all the function declarations and constants that you can use to develop your data acquisition application.

Incorporate the following statement in your code to include the header file.

#include "ATDAQDLL.H"

step 3. Build your application.

Setting the appropriate compile and link options, then build your application by selecting the Build command from Build menu (Visual C/C++ 4.0) or Project menu (Visual C/C++ 1.52). Remember to link appropriate ATDAQ DLL's import libraries.

2

Software Overview

Each CyberResearch ISA-bus multi-function card has its own DLL driver. How to use these DLL to build your own application has been described in section 1.7. The function calls in these DLLs use intuitive names that reflect the operations they perform. For example,

W_ATDAQ1200_AD_Set_Channel sets the A/D reading channel.

The functionality of these function calls can be classified to the following capabilities,

1. Initialization : setup the hardware base I/O address
2. A/D conversion : performs analog to digital conversion
3. D/A conversion : performs digital to analog conversion
4. Digital I/O : input or output digital signals
5. Timer/Counter : Timer/Counter operation

In addition, some sample programs are also included in this disk. They help you to understand how to use the driver more quickly.

We defined some data types in ATDAQDLL.H. These data types are used by ATDAQ DLL library. We suggest you to use these data types in your application programs. The following table shows the data type names and their ranges.

Type Name	Description	Range
U8	8-bit ASCII character	0 to 255
I16	16-bit signed integer	-32768 to 32767

U16	16-bit unsigned integer	0 to 65535
I32	32-bit signed integer	-2147483648 to 2147483647
U32	32-bit unsigned integer	0 to 4294967295
F32	32-bit single-precision floating-point	-3.402823E38 to 3.402823E38
F64	64-bit double-precision floating-point	-1.797683134862315E308 to 1.797683134862315E309
Boolean	Boolean logic value	TRUE, FALSE

The ATDAQ DLL contains eight multi-function cards' DLL drivers. They are ATAO06.DLL, ATAO02.DLL, ATDAQ1200.DLL, ATDAQ1411.DLL, ATDAQ1400.DLL, ATDAQ3210.DLL, ATDAQ3210A.DLL, ATDAQ1412HR.DLL and ATDAQ1612HR.DLL.

2.1 Software Driver Naming Convention

The functions of ATDAQ DLL use full-names to represent the real meaning of the functions. The naming convention rules are:

W_{hardware_model}_{action_name}. e.g.
W_ATDAQ1200_Initial ().

2.2 Initialization and General Configuration Functions

W_{hardware_model}_Initial	Initializes the hardware and the software status of a CyberResearch ISA-Based multi-function card according to the card number and the corresponding base address.
W_{hardware_model}_Switch_Card_No W_{hardware_model}_ActCard_Set	Sets the status of the card you want to operate to be active in a multi-cards system.

2.3 A/D Conversion Functions

W_{hardware_model}_AD_Input_Mode	Informs ATDAQ DLL of the A/D input mode (single-ended or differential).
W_{hardware_model}_AD_Set_Channel W_{hardware_model}_AD_Channel_Select	Selects the specified analog input channel.
W_{hardware_model}_AD_Channel_Deselect	Removes the specified analog input channel from the list of selected channels (This function is only available for ATDAQ 3210/A card).
W_{hardware_model}_AD_Channel_Clear	Clears all of the analog input channels from the list of selected channels, and no channel is selected (This function is only available for ATDAQ 3210/A card).
W_{hardware_model}_AD_ChannelNo_Get	Gets the number of the

	selected channels (This function is only available for ATDAQ 3210/A card).
W_{hardware_model}_AD_Set_Gain W_{hardware_model}_Gain_Select W_{hardware_model}_AD_Set_Range	Informs ATDAQ DLL of the A/D analog input range.
W_{hardware_model}_AD_Set_Mode	Informs ATDAQ DLL of the A/D trigger and data transfer mode.
W_ATDAQ1612HR_AD_Set_Autoscan	Enables automatic channel scan for A/D conversion (This function is only available for ATDAQ 1612/HR card).
W_ATDAQ1612HR_AD_Set_FIFO	Enables the FIFO on the ATDAQ 1612/HR (This function is only available for ATDAQ 1612/HR card).
W_ATDAQ1612HR_AD_Read_FIFO	Gets the A/D conversion data stored in the FIFO on the ATDAQ 1612/HR card (This function is only available for ATDAQ 1612/HR card).
W_{hardware_model}_AD_Soft_Trig	Triggers the A/D conversion by software.
W_{hardware_model}_AD_Aquire	Polls the A/D conversion data
W_{hardware_model}_MAD_Aquire	Polls the A/D conversion datum from the selected channels and puts the datum in a specified

	array (This function is only available for ATDAQ 3210/A card).
W_{hardware_model}_Get_MAD_Data	Gets the datum from a specified data array (This function is only available for ATDAQ 3210/A card).
W_{hardware_model}_AD_Set_INT_Source	Informs ATDAQ DLL of the interrupt trigger source for the A/D analog input.
W_{hardware_model}_CLR_IRQ	Clear an interrupt request
W_{hardware_model}_AD_INT_Start	Performs A/D analog input N times with interrupt data transfer by using external/internal interrupt trigger.
W_{hardware_model}_AD_ContINT_Start	Performs continuous A/D analog input with interrupt data transfer by using external/internal interrupt trigger.
W_{hardware_model}_AD_SCANINT_Start	Performs automatic channel scan for A/D conversion with interrupt data transfer by using external/internal interrupt trigger.
W_{hardware_model}_AD_INT_Staus	Checks the current status of the interrupt operation.
W_{hardware_model}_AD_INT_Stop	Stops the interrupt data

	transfer.
W_{hardware_model}_AD_DMA_Start	Performs A/D analog input N times with DMA data transfer by using external/internal interrupt trigger.
W_{hardware_model}_AD_ContDMA_Start	Performs continuous A/D analog input with DMA data transfer by using external/internal interrupt trigger.
W_{hardware_model}_ AD_DMA_Status	Checks the current status of A/D analog input with DMA data transfer.
W_{hardware_model}_ AD_DMA_Stop	Stops A/D analog input with DMA data transfer.
W_{hardware_model}_ AD_DblBufferHalfReady	Check whether data half full or not in circular buffer.
W_{hardware_model}_ AD_DblBufferTransfer	Copy the converted A/D data from circular buffer to user buffer.

2.4 D/A Conversion Functions

W_{hardware_model}_DA_Set_Mode	Informs ATDAQ DLL of the D/A output mode (This function is only available for ATDAQ 1612/HR card).
W_{hardware_model}_DA	Writes data to one of the analog output channels,

	changing the voltage produced at the channel.
Set_INT_Op	Informs ATDAQ DLL of the D/A channel and the data buffer that will be used to perform D/A conversion with interrupt data transfer (This function is only available for ATAO 06 card).
Reset_INT_Op	Reset the D/A channel and data buffer settings of D/A conversion with interrupt data transfer (This function is only available for ATAO 06 card).
W_ATAO06_INT_Start	Initializes and starts up the D/A conversion with interrupt control of ATAO 06 card (This function is only available for ATAO 06 card).
W_ATAO06_INT_Status	Checks the current status of D/A conversion with interrupt operation of ATAO 06 card (This function is only available for ATAO 06 card).
W_ATAO06_INT_Stop	Stops the D/A conversion with interrupt operation of ATAO 06 card (This function is only available for ATAO 06 card).

2.5 Digital I/O Functions

W_{hardware_model}_DI	Reads the digital data from the specified input port.
W_{hardware_model}_DI_Channel	Reads the digital data from the specified input channel.
W_{hardware_model}_DO	Writes the digital data to the specified output port.
W_{hardware_model}_DO_Channel	Writes the digital data to the specified output line.

2.6 Timer/Counter Operation Functions

W_{hardware_model}_AD_Timer	Starts up internal Timers for generating constant A/D trigger signal dedicatedly.
W_{hardware_model}_Timer_Start	Start up Timer #0 to operate in the specified mode.
W_{hardware_model}_Timer_Stop	Stop Timer #0.
W_{hardware_model}_Timer_Read	Reads the current contents of Timer #0.

3

Sample Programs

3.1 Sample Programs Included

There are several sample programs provided in this software CD. They could help you to program your own applications by using ATDAQ DLL easily. The brief descriptions of these programs are specified as follows:

SDK ATAO06	D/A conversion, D/I, and D/O of ATAO 06 Microsoft C/C++ Program
SDK ATAO06INT	D/A conversion of ATAO 06 through Interrupt operation Microsoft C/C++ Program
SDK ATAO02	D/A conversion of ATAO 02 Microsoft C/C++ Program
SDK ATDAQ1200 / VB ATDAQ1200	A/D conversion, D/A conversion, D/I, and D/O of ATDAQ 1200 Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1200INT	A/D conversion of ATDAQ 1200 through Interrupt operation Microsoft C/C++ Program

SDK ATDAQ1200 AutoScan	A/D conversion of ATDAQ 1200 AutoScan mode through Interrupt operation Microsoft C/C++ Program
SDK ATDAQ1200 ContINT	Continuous A/D conversion of ATDAQ 1200 through Interrupt operation Microsoft C/C++ Program
SDK ATDAQ1200 ContAutoScan	Continuous A/D conversion of ATDAQ 1200 AutoScan mode through Interrupt operation Microsoft C/C++ Program
SDK ATDAQ1411 / VB ATDAQ1411	A/D conversion, D/A conversion, D/I, and D/O of ATDAQ 1411/1412 Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1411DMA / VB ATDAQ1411DMA	A/D conversion of ATDAQ 1411/1412 through DMA data transfer Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1411INT / VB ATDAQ1411INT	A/D conversion of ATDAQ 1411/1412 through Interrupt operation Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1411AutoScan/ VB ATDAQ1411AutoScan	A/D conversion of ATDAQ 1411/1412 AutoScan mode through Interrupt operation Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1411 ContINT/ VB ATDAQ1411 ContINT	Continuous A/D conversion of ATDAQ 1411/1412 through Interrupt operation Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1411 ContAutoScan	Continuous A/D conversion of ATDAQ 1411/1412 AutoScan mode through Interrupt operation Microsoft C/C++ Program Visual Basic Program
SDKATDAQ1411ContDMA / VB ATDAQ1411 ContDMA	Continuous A/D conversion of ATDAQ 1411/1412 through DMA data transfer Microsoft C/C++ Program Visual Basic Program

SDK ATDAQ1400 / VB ATDAQ1400	A/D conversion, D/A conversion, D/I, and D/O of ATDAQ 1400 Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1400 INT	A/D conversion of ATDAQ 1400 through Interrupt operation Microsoft C/C++ Program
SDK ATDAQ1400 DMA	A/D conversion of ATDAQ 1400 through DMA data transfer operation Microsoft C/C++ Program
SDK ATDAQ1400 AutoScan	A/D conversion of ATDAQ 1400 AutoScan mode through Interrupt operation Microsoft C/C++ Program
SDK ATDAQ1400 ContINT	Continuous A/D conversion of ATDAQ 1400 through Interrupt operation Microsoft C/C++ Program
SDK ATDAQ1400 ContDMA	Continuous A/D conversion of ATDAQ 1400 through DMA data transfer operation Microsoft C/C++ Program
SDK ATDAQ3210	A/D conversion of ATDAQ 3210 Microsoft C/C++ Program
SDK ATDAQ3210A	A/D conversion of ATDAQ 3210A Microsoft C/C++ Program
SDK ATDAQ1412HR/ VB ATDAQ1412HR	A/D conversion, D/A conversion, D/I, and D/O of ATDAQ 1412HR Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1412HRDMA/ VB ATDAQ1412HRDMA	A/D conversion of ATDAQ 1412HR through DMA data transfer Microsoft C/C++ Program Visual Basic Program

SDK ATDAQ1412HRINT/ VB ATDAQ1412HRINT	A/D conversion of ATDAQ 1412HR through Interrupt operation Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1412HR AutoScan	A/D conversion of ATDAQ 1412HR AutoScan mode through Interrupt operation Microsoft C/C++ Program
SDK ATDAQ1412HR ContINT	Continuous A/D conversion of ATDAQ 1412HR through Interrupt operation Microsoft C/C++ Program
SDK ATDAQ1412HRContDMA	Continuous A/D conversion of ATDAQ 1412HR through DMA data transfer Microsoft C/C++ Program
SDK ATDAQ1612HR/ VB ATDAQ1612HR	A/D conversion, D/A conversion, D/I, and D/O of ATDAQ 1612HR Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1612HRDMA/ VB ATDAQ1612HRDMA	A/D conversion of ATDAQ 1612HR through DMA data transfer Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1612HRINT/ VB ATDAQ1612HRINT	A/D conversion of ATDAQ 1612HR through Interrupt operation Microsoft C/C++ Program Visual Basic Program
SDK ATDAQ1612HR ContINT	Continuous A/D conversion of ATDAQ 1612HR through Interrupt operation Microsoft C/C++ Program
SDK ATDAQ1612HR ContAutoScan	Continuous A/D conversion of ATDAQ 1612HR AutoScan mode through Interrupt operation Microsoft C/C++ Program
SDK ATDAQ1612HRContDMA	Continuous A/D conversion of ATDAQ 1612HR through DMA data transfer Microsoft C/C++ Program

3.2 Sample Programs Developed Environment

3.2.1 Visual Basic Sample Programs

There are eight Visual Basic sample programs provided in this software package. By default, they are located in directory C:\ATDAQ DLL\SAMPLES\VB. The following files are included in each sample program (Using VB ATDAQ1411int as an example):

- VB project file --- ATDAQ1411INT.VBP
- VB form files --- ATDAQ1411INT.FRM, FRMADDR.FRM
- Executable file --- ATDAQ1411INT.EXE

You must have Microsoft Visual Basic 4.0 Professional Edition or above to deal with these sample programs. Please refer to Visual Basic Manual or related reference books to get the information about how to use Visual Basic 4.0.

3.2.2 Microsoft C/C++ Sample Programs

We provide nine Microsoft C/C++ sample programs in this package. By default, they are located in directory C:\ATDAQ DLL\SAMPLES\SDK. The following files are included in each sample program (Using SDK ATDAQ1411 as an example):

- C source file --- UTILATDAQ1411.C
- Workspace file --- UTILATDAQ1411.MDP
- Resource script file --- UTILATDAQ1411.RC, RESOURCE.H
- Make file --- UTILATDAQ1411.MAK
- Executable file --- UTILATDAQ1411.EXE

You can use any editor or Microsoft Visual C++ 4.0 to view or modify these source files. However, to build the executable UTILATDAQ1411.EXE, you must have Microsoft Visual C++ 4.0 or above. Please refer to Visual C++ Manual or related reference books to get the information about how to use Visual C++ 4.0.

3.3 Execute Sample Programs

To run the sample programs, please follow these step (Using SDKATDAQ1411/VBATDAQ1411 as example):

step 1. Open the sample program
You can use Microsoft Visual C++ 4.0 or Visual Basic 4.0 to open and execute the sample programs. Or you can run the executable files directly.

step 2. Configuration Setting

According to the configuration setting on your CyberResearch card, input the related Base Address, IRQ, DMA Channel number (only support DMA channel 1) and Input Mode of the card in “setup” dialog box (Figure 3.1).

Figure 3.1

Note: If your environment is Windows NT and your irq level is not the same as the default value, please refer to section 2.4 to learn how to change irq level.

step 3. Option Setting

According to your requirements, select the testing functions, e.g. A/D, D/A, ..etc., testing channels, sampling rate and data value (transfer count).

step 4. Push “start” button to run the program.

3.4 The Detailed Descriptions of these Sample Programs

There are three kinds of sample programs provided in this software package. The descriptions of these three types are the following (Using the screens of VB ATDAQ1411, SDK ATDAQ1411DMA and SDK ATDAQ1411INT as the figure examples) :

3.4.1 A/D conversion, D/A conversion, D/I, and D/O

This kind of samples are used to demonstrate how to use ATDAQ DLL to operate software trigger with program polling data mode and Read/Write data from digital input/output channels. The main screen of this kind of programs is shown below (Figure 3.2):

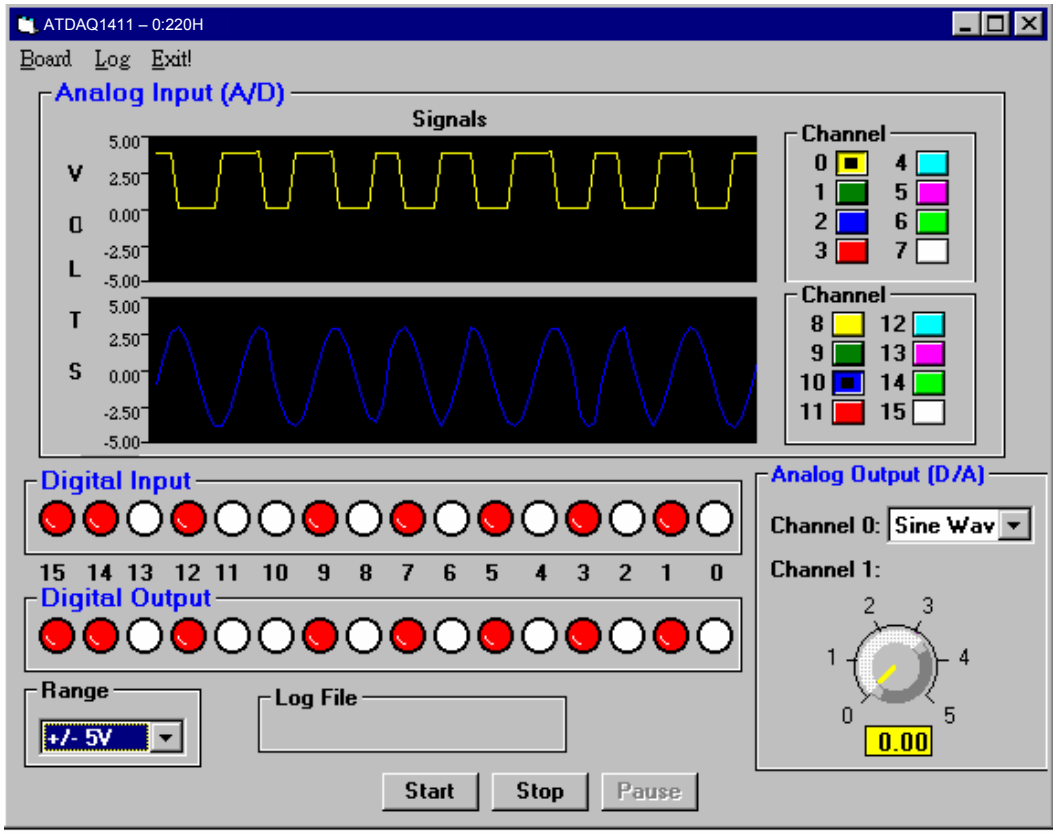


Figure 3.2

Analog Input (A/D) : This is used to show the results of A/D conversion. You can select the Input channels (multi-channels) and the input range(gain) you want from the main screen.

Analog output (D/A): This is used to show the results of D/A conversion. Dragging the scroll bar (SDK sample) or turning the knob (VB sample) to set the output voltage. In VB program, you can also choose the output waveform (sine or square).

D/I and D/O: This is used to show the results of Read/Write data from/to digital input/output channels. To set the output value, click the channel lights. The red light means “on” and the white light means “off”.

3.4.2 A/D conversion through DMA Data Transfer

This kind of programs is used to demonstrate how to use ATDAQ DLL to operate A/D conversion through DMA data transfer. The main screen of this kind of programs is shown below (Figure 3.3):

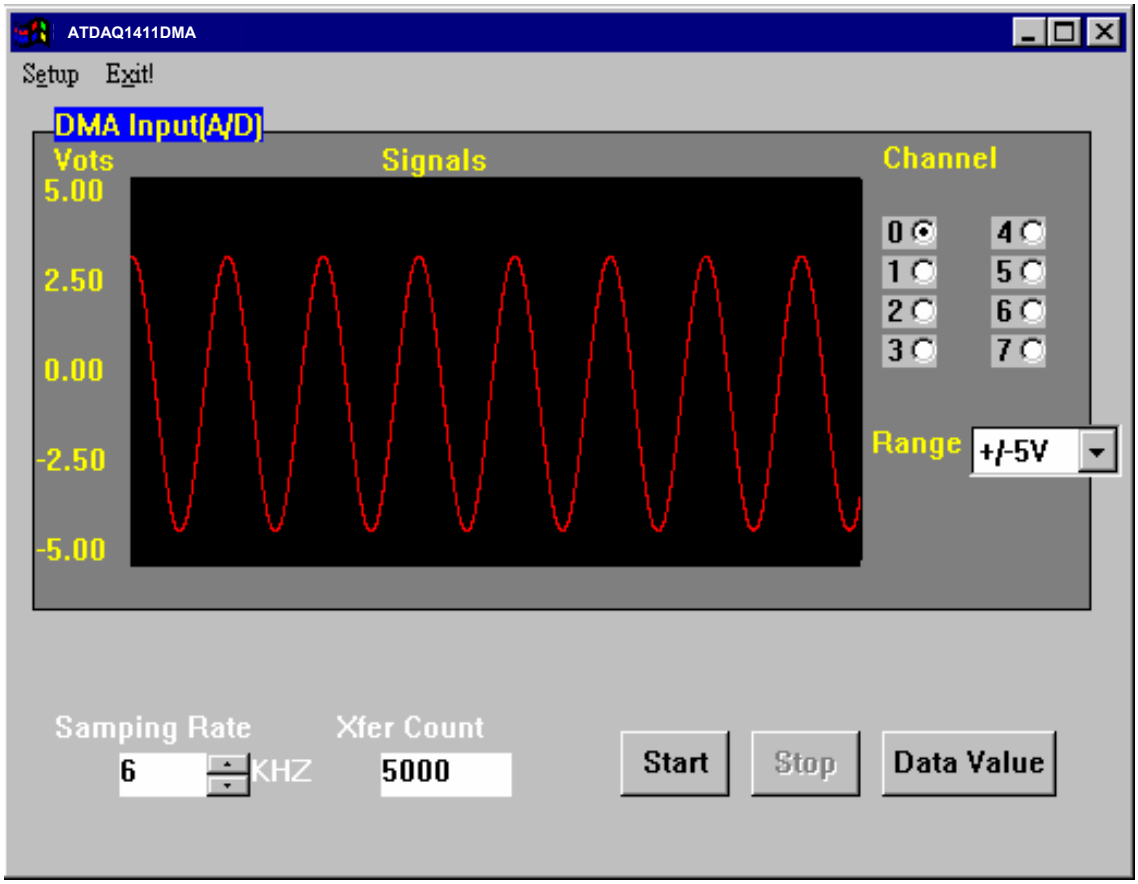


Figure 3.3

In this kind of programs you can select Input channels (Multi-channels), Sampling Rate, Input range and data size (Transfer count) as you wish. To view the input data, push “Data Value” button in the main screen as data transfer is finished (Figure 3.4).

Note: These DMA sample programs only support DMA channel 1.

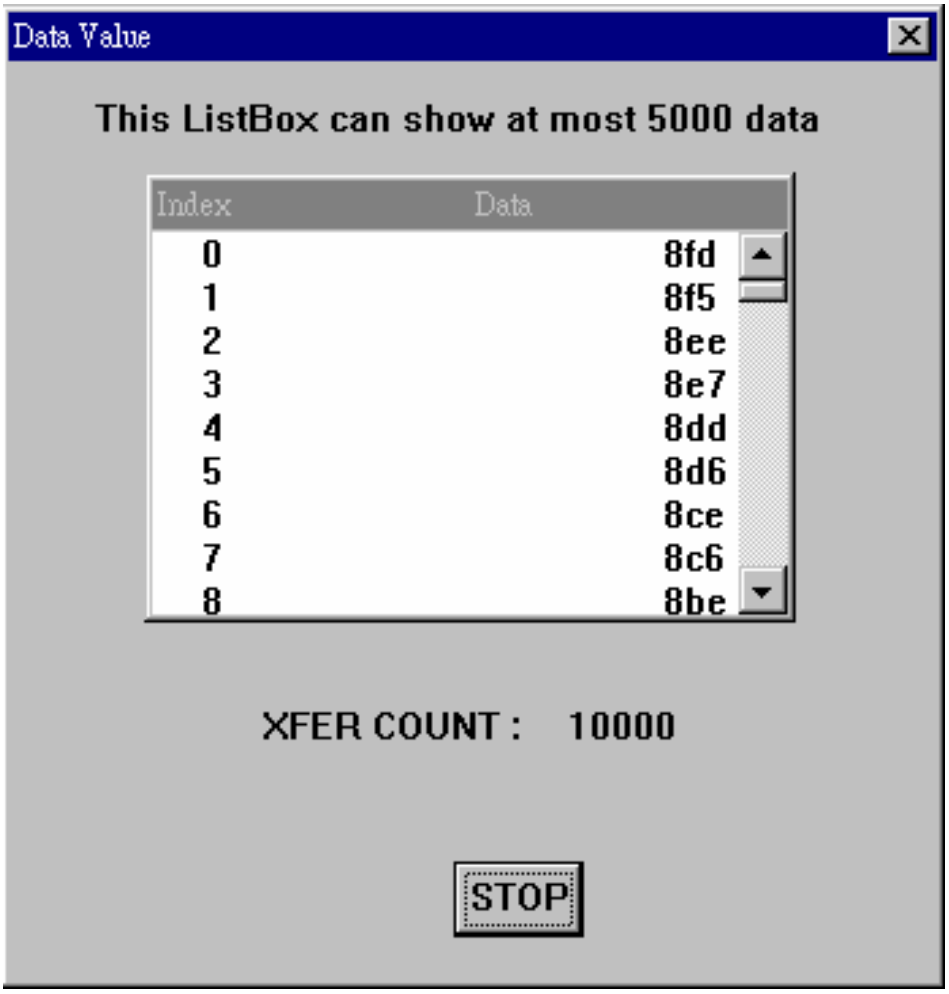


Figure 3.4

3.4.3 A/D conversion through Interrupt

This kind of programs is used to demonstrate how to use ATDAQ DLL to operate A/D conversion through Interrupt operation. The screen of this kind of programs is shown below (Figure 3.5) :

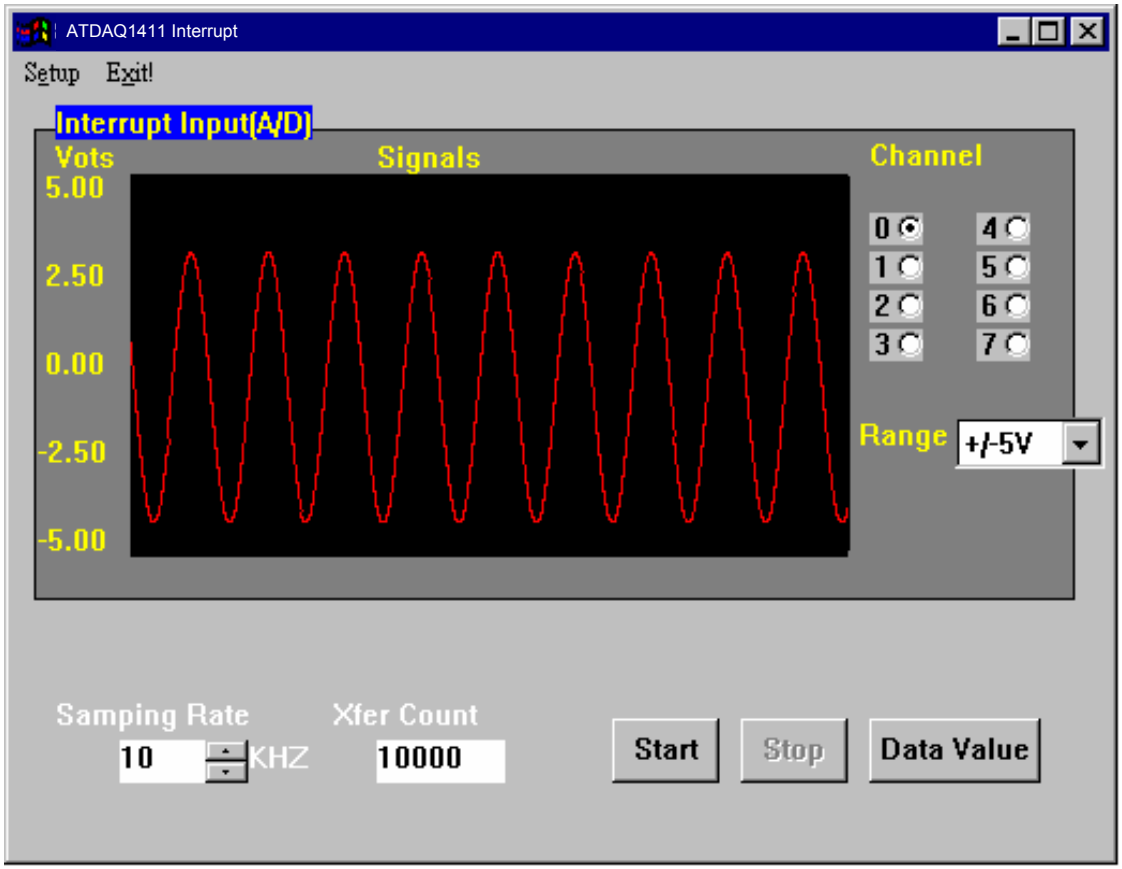


Figure 3.5

In this kind of programs you can select Input channels (Multi-channels), Sampling Rate, input range and data size (Transfer count) as you wish. To view the input data, push “Data Value” button in the main screen as data transfer operation is finished.

Product Service

Diagnosis and Debug

CyberResearch, Inc. maintains technical support lines staffed by experienced Applications Engineers and Technicians. There is no charge to call and we will return your call promptly if it is received while our lines are busy. Most problems encountered with data acquisition products can be solved over the phone. Signal connections and programming are the two most common sources of difficulty. CyberResearch support personnel can help you solve these problems, especially if you are prepared for the call.

To ensure your call's overall success and expediency:

1) Have the phone close to the PC so you can conveniently and quickly take action that the Applications Engineer might suggest.
2) Be prepared to open your PC, remove boards, report back-switch or jumper settings, and possibly change settings before reinstalling the modules.
3) Have a volt meter handy to take measurements of the signals you are trying to measure as well as the signals on the board, module, or power supply.
4) Isolate problem areas that are not working as you expected.
5) Have the source code to the program you are having trouble with available so that preceding and prerequisite modes can be referenced and discussed.
6) Have the manual at hand. Also have the product's utility disks and any other relevant disks nearby so programs and version numbers can be checked.

Preparation will facilitate the diagnosis procedure, save you time, and avoid repeated calls. Here are a few preliminary actions you can take before you call which may solve some of the more common problems:

1) Check the PC-bus power and any power supply signals.
2) Check the voltage level of the signal between SIGNAL HIGH and SIGNAL LOW, or SIGNAL+ and SIGNAL– . It CANNOT exceed the full scale range of the board.
3) Check the other boards in your PC or modules on the network for address and interrupt conflicts.
4) Refer to the example programs as a baseline for comparing code.

Intentionally Blank

Warranty Notice

CyberResearch, Inc. warrants that this equipment as furnished will be free from defects in material and workmanship for a period of one year from the confirmed date of purchase by the original buyer and that upon written notice of any such defect, CyberResearch, Inc. will, at its option, repair or replace the defective item under the terms of this warranty, subject to the provisions and specific exclusions listed herein.

This warranty shall not apply to equipment that has been previously repaired or altered outside our plant in any way which may, in the judgment of the manufacturer, affect its reliability. Nor will it apply if the equipment has been used in a manner exceeding or inconsistent with its specifications or if the serial number has been removed.

CyberResearch, Inc. does not assume any liability for consequential damages as a result from our products uses, and in any event our liability shall not exceed the original selling price of the equipment.

The equipment warranty shall constitute the sole and exclusive remedy of any Buyer of Seller equipment and the sole and exclusive liability of the Seller, its successors or assigns, in connection with equipment purchased and in lieu of all other warranties expressed implied or statutory, including, but not limited to, any implied warranty of merchant ability or fitness and all other obligations or liabilities of seller, its successors or assigns.

The equipment must be returned postage prepaid. Package it securely and insure it. You will be charged for parts and labor if the warranty period has expired.

Returns and RMAs

If a CyberResearch product has been diagnosed as being non-functional, is visibly damaged, or must be returned for any other reason, please call for an assigned RMA number. The RMA number is a key piece of information that lets us track and process returned merchandise with the fastest possible turnaround time.

PLEASE CALL FOR AN RMA NUMBER!

Packages returned without an RMA number will be refused!

In most cases, a returned package will be refused at the receiving dock if its contents are not known. The RMA number allows us to reference the history of returned products and determine if they are meeting your application's requirements. When you call customer service for your RMA number, you will be asked to provide information about the product you are returning, your address, and a contact person at your organization.

Please make sure that the RMA number is prominently displayed on the outside of the box.

• Thank You •

Intentionally Blank

CyberResearch, Inc.
25 Business Park Drive
Branford, CT 06405 USA
P: (203) 483-8815; F: (203) 483-9024
www.cyberresearch.com